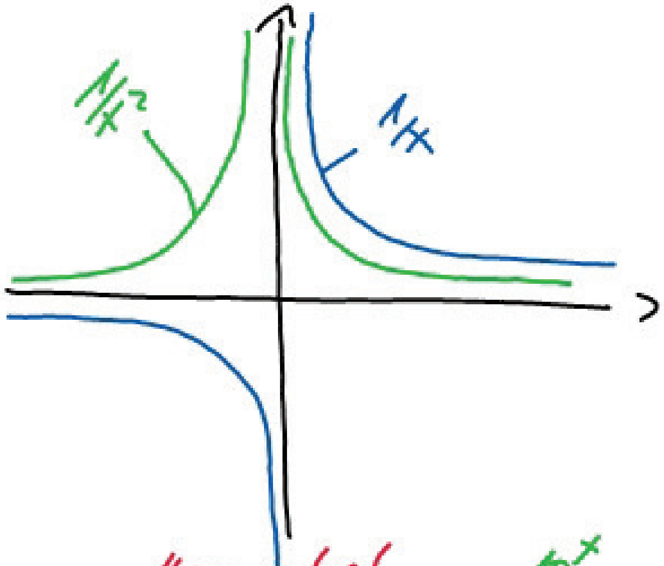
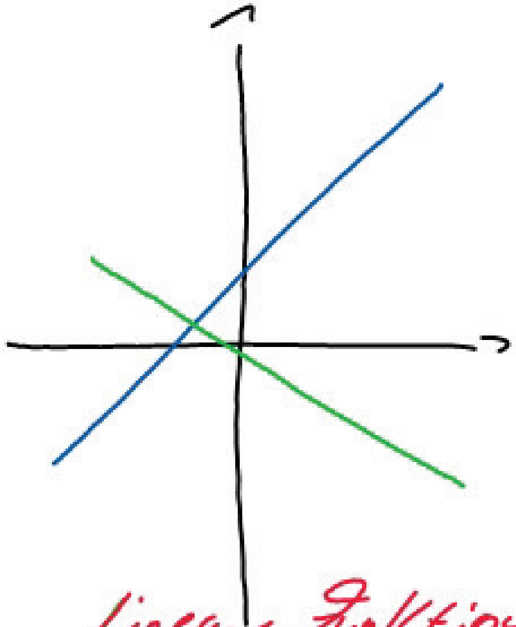
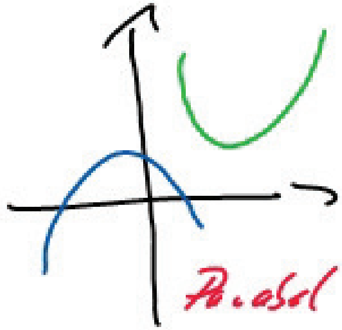
Funktionsarten



Hyperbel



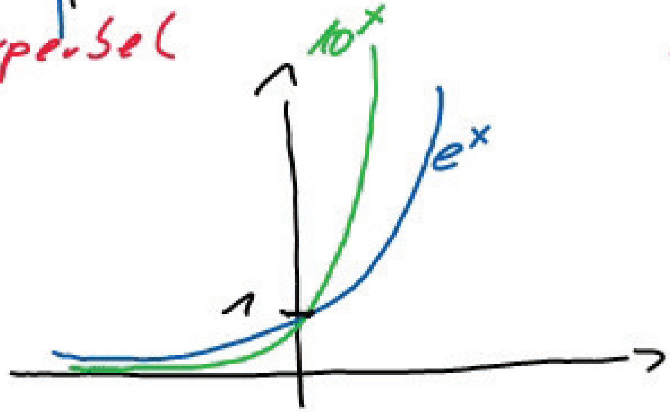
Lineare Funktion



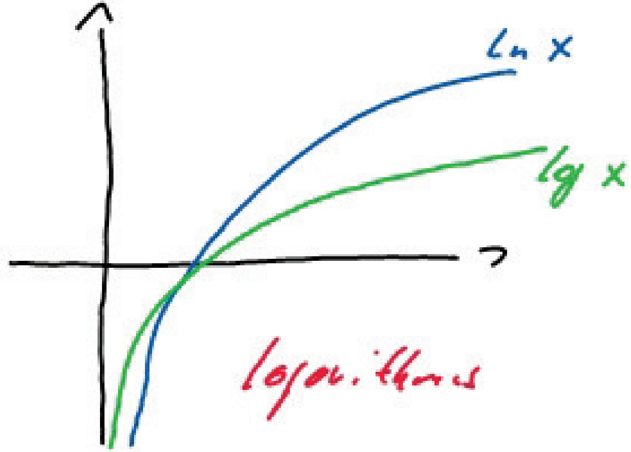
Parabel

$$m = \frac{a}{b}$$

$$y = m \cdot x + b$$



Exponentialfunktion



Logarithmus

I. 1) $\mathbb{L} = \{-1; 5\}$

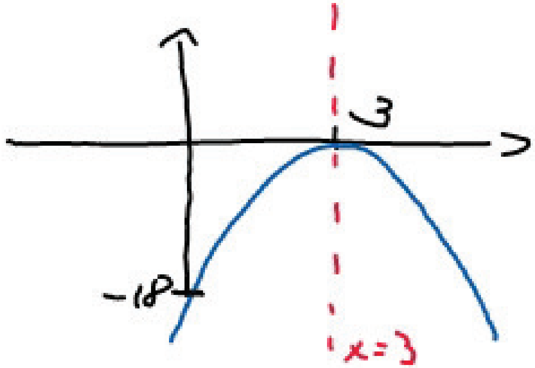
2) $\mathbb{L} = \{\ \}$ $\quad x^2 - 3x + 10 = 0 \quad \Rightarrow D = (\frac{3}{2})^2 - 10 < 0$

3) $\mathbb{L} = \{-8; -4\}$

II. 4) $f(x) = -2x^2 + 12x - 18 = -2 \cdot (x^2 - 6x\ 9)$

$S_x(3|0) \hat{=} S(3|0)$; $S_y(0|-18) = -2\ (x-3)^2$

↓ steilen $\quad S = HP$



Symmetrieachse $x=3$

$\mathbb{D} = \mathbb{R}$; $\mathbb{W} = \mathbb{R}_0^-$

5) $f(x) = \frac{1}{2}x^2 + 10x + 32 = \frac{1}{2}(x^2 + 20x + 64)$

$= \frac{1}{2}(x+16)(x+4)$

$S_{x_1}(-16 / 0)$

$S_{x_2}(-4 / 0)$

$S_y(0 / 32)$

$S(-10 / f(-10)) = S(-10 / -18) \rightarrow TP$

$\hookrightarrow \frac{1}{2} \cdot (-10+16)(-10+4)$

$\uparrow$ flacher, $\qquad D = \mathbb{R} \qquad W = \mathbb{R}^{\geq -18}$

Symmetrieachse bei $x = -10$

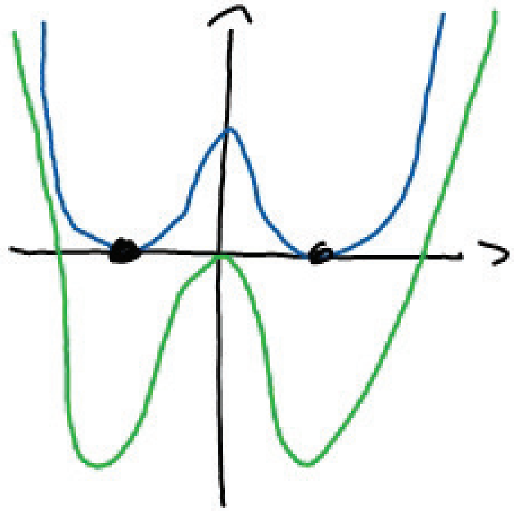
7) $x^4 - 24x^2 - 25 = 0$ $\qquad z = x^2$

$z^2 - 24z - 25 = 0$

$(z - 25)\overbrace{(z + 1)}^{\neq 0} = 0$

$z_1 = 25 \lor z_2 = 0$ $\qquad x = \pm\sqrt{z}$

$x_1 = 5 \lor x_2 = -5$



8) $x^8 - 17x^4 + 16 = 0$

$(x^4 - 16)(x^4 - 1) = 0$

$$\left.\begin{aligned} x &= \pm\sqrt[4]{16} = \pm 2 \\ x &= \pm\sqrt[4]{1} = \pm 1 \end{aligned}\right\} \mathbb{L} = \{-2; -1; 1; 2\}$$

Ungleichungen $\{>; \geq; <; \leq\}$

$\Rightarrow$ Punktrechnung mit negativen Zahlen dreht das Ungleichheitszeichen um.

a) $-2x \geq 8 \quad | :(-2)$

$x \leq -4$

b) $x \cdot \log 0{,}4 > \log 2 \quad | :(\underbrace{\log 0{,}4}_{<0})$

$x < \frac{\log 2}{\log 0{,}4} = \log_{0{,}4} 2$

c) $5 > 4 - 3/x \quad | -4$

$1 > -3/x \quad | \cdot(-x)$

$-x < 3 \quad | \cdot(-1)$

$x > -3$

$\mathbb{L} = \{x \in \mathbb{R} \setminus \{0\} \mid x > -3\}$

Betragsfunktion

$f(x) = |\ldots| \geq 0$

$$f(x) = |\overbrace{2 - \tfrac{1}{3}x}^{0:\ x=6}|$$

$x \geq 6 \rightarrow \ominus$ $\quad -(2 - \tfrac{1}{3}x) = f(x)$

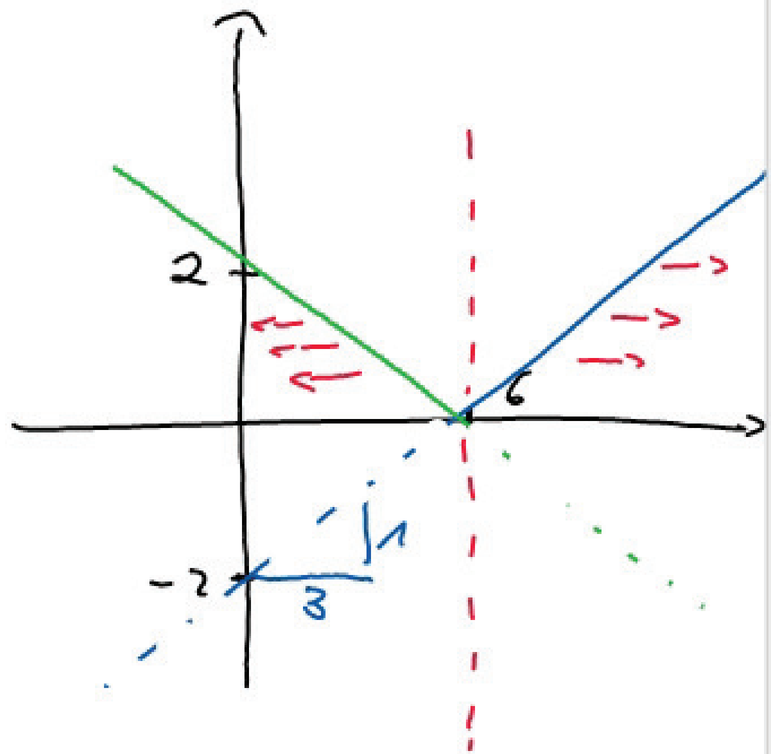
$x < 6 \rightarrow \oplus$ $\quad 2 - \tfrac{1}{3}x = f(x)$

$$f(9) = |2 - \tfrac{1}{3} \cdot 9| = |-1| = 1$$

$$f(3) = |2 - \tfrac{1}{3} \cdot 3| = |1| = 1$$

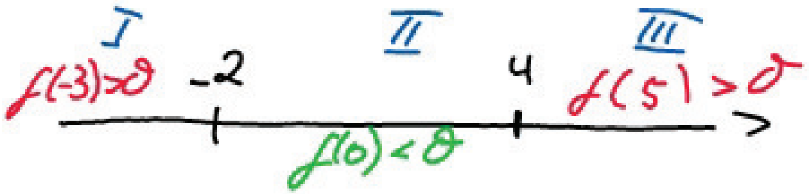
$$f(x) = \begin{cases} \tfrac{1}{3}x - 2 & ; \ x \geq 6 \\ -\tfrac{1}{3}x + 2 & ; \ x < 6 \end{cases}$$

↳ gesplittete Funktion

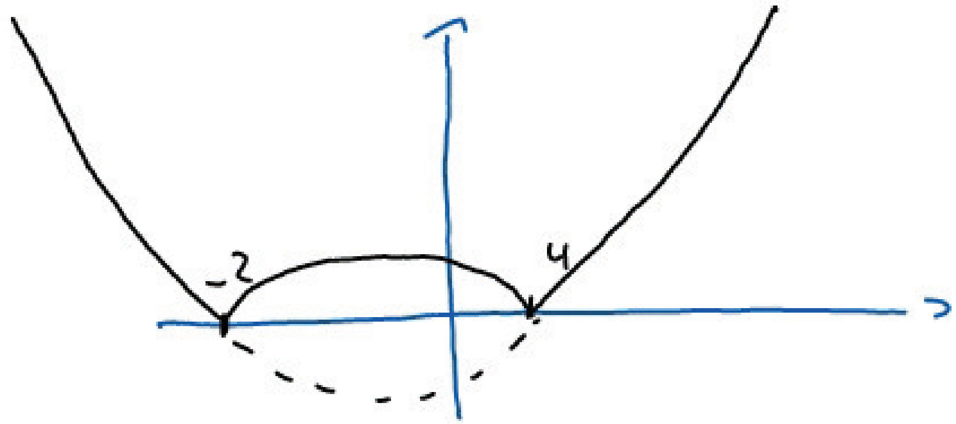


$$f(x) = |x^2 - 2x - 8| = |(x-4)(x+2)|$$

$x_1 = 4 \vee x_2 = -2$



$$f(x) = \begin{cases} x^2 - 2x - 8 \, ; & x \leq -2 & \mathrm{I} \\ -x^2 + 2x + 8 \, ; & x > -2 \wedge x < 4 & \mathrm{II} \\ x^2 - 2x - 8 \, ; & x \geq 4 & \mathrm{III} \end{cases}$$

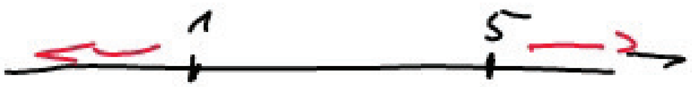


S. 174 Nr. 5) $|4x-12| > 8$

$$\underbrace{4x-12}_{0} \Rightarrow x = 3$$

F	$x \geq 3$: $4x-12 > 8$ δ^{+}	$x < 3$: $-(4x-12) > 8$ δ^{-}
R	$4x - 12 > 8 \quad \mid +12 \; \cdot \frac{1}{4}$ $x > 5$	$-4x + 12 > 8 \quad \mid -12 \; \cdot (-\frac{1}{4})$ $x < 1$
G	$x > 5$	$x < 1$
P	$x = 6$: $\lvert 24-12 \rvert > 8$ ✓	$x = 0$ $\lvert 0 - 12 \rvert > 8$ ✓

L



$$\mathbb{L} = \{ x \in \mathbb{R} \mid x < 1 \lor x > 5 \}$$